

England, the lower Lake region, and the middle Pacific districts; elsewhere it was above the normal, with decided departures in the east Gulf States, Missouri Valley, and the slope districts.

#### SUNSHINE AND CLOUDINESS.

The cloudiness was above the average in the South Atlantic and Gulf States; the upper Mississippi and Missouri valleys; the slope and northern Plateau regions, and the North Pacific and South Pacific districts; elsewhere it was below the average.

The distribution of sunshine is graphically shown on Chart VII, and the numerical values of average daylight cloudiness, both for individual stations and by geographical districts, appear in Table I.

The averages for the various districts, with departures from the normal, are shown in the following table:

*Average cloudiness and departures from the normal.*

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
New England . . . . .	3.6	- 1.9	Missouri Valley . . . . .	5.6	+ 0.2
Middle Atlantic . . . . .	4.2	- 1.0	Northern Slope . . . . .	5.5	+ 0.1
South Atlantic . . . . .	5.2	+ 0.8	Middle Slope . . . . .	5.9	+ 1.1
Florida Peninsula . . . . .	4.1	- 0.4	Southern Slope . . . . .	4.8	+ 0.3
East Gulf . . . . .	5.8	+ 1.5	Southern Plateau . . . . .	3.0	+ 0.8
West Gulf . . . . .	5.5	+ 0.6	Middle Plateau . . . . .	4.0	- 0.1
Ohio Valley and Tennessee . . . . .	5.0	- 0.1	Northern Plateau . . . . .	5.0	- 0.6
Lower Lake . . . . .	3.7	- 1.5	North Pacific . . . . .	6.7	+ 0.8
Upper Lake . . . . .	5.4	- 0.1	Middle Pacific . . . . .	2.9	- 1.3
North Dakota . . . . .	5.1	- 0.2	South Pacific . . . . .	4.4	+ 0.2
Upper Mississippi Valley . . . . .	6.0	+ 0.8			

#### ATMOSPHERIC ELECTRICITY.

Numerical statistics relative to auroras and thunderstorms are given in Table IV, which shows the number of stations from which meteorological reports were received, and the number of such stations reporting thunderstorms (T) and auroras (A) in each State and on each day of the month, respectively.

*Thunderstorms.*—Reports of 5690 thunderstorms were received during the current month as against 6425 in 1902 and 2677 during the preceding month.

The dates on which the number of reports of thunderstorms for the whole country was most numerous were: 28th, 411; 22d, 393; 27th, 339; 21st, 332.

Reports were most numerous from: Missouri, 506; Iowa, 441; Nebraska, 374; Ohio, 301.

#### DESCRIPTION OF TABLES AND CHARTS.

By Mr. W. B. STOCKMAN, Forecast Official, in charge of Division of Meteorological Records.

Table I gives, for about 137 Weather Bureau stations making two observations daily and for about 31 others making only one observation, the data ordinarily needed for climatological studies, viz, the monthly mean pressure, the monthly means and extremes of temperature, the average conditions as to moisture, cloudiness, movement of the wind, and the departures from normals in the case of pressure, temperature, and precipitation, the total depth of snowfall, and the mean wet-bulb temperatures. The altitudes of the instruments above ground are also given.

Table II gives, for about 2,800 stations occupied by voluntary and other cooperating observers, the highest maximum and the lowest minimum temperatures, the mean temperature deduced from the average of all the daily maxima and minima, or other readings, as indicated by the numeral following the name of the station, the total monthly precipitation, and the total depth in inches of any snow that may have fallen. When the spaces in the snow column are left blank it indicates that no snow has fallen, but when it is possible that there may have been snow of which no record has been made, that fact is indicated by leaders, thus (....).

*Auroras.*—The evenings on which bright moonlight must have interfered with observations of faint auroras are assumed to be the four preceding and following the date of full moon, viz: 7th to 15th.

*In Canada.*—Thunderstorms were reported at Grand Manan, 20, 21; Yarmouth, 21; Father Point, 21, 28; Quebec, 18, 20, 21; Bissett, 18, 19, 21, 27, 28; Kingston, 28; Toronto, 18, 27; White River, 18; Port Stanley, 20, 24, 26, 27, 28; Saugeen, 21; Parry Sound, 21, 26, 27; Port Arthur, 19; Winnipeg, 17; Medicine Hat, 24, 26; New Westminster, 14; Hamilton, Bermuda, 6.

Auroras were reported from Minnedosa on the 24th and 29th.

#### WIND.

The maximum wind velocity at each Weather Bureau station for a period of five minutes is given in Table I, which also gives the altitude of Weather Bureau anemometers above ground.

Following are the velocities of 50 miles and over per hour registered during the month:

*Maximum wind velocities.*

Stations.	Date.	Velocity.	Direction.	Stations.	Date.	Velocity.	Direction.
Bismarck, N. Dak.	21	52	se.	Point Reyes Light, Cal.	6	50	n.w.
Buffalo, N. Y.	3	53	sw.	Do.	9	66	n.w.
Cape Henry, Va.	22	52	n.w.	Do.	10	58	n.w.
Do.	24	60	n.	Do.	14	64	n.w.
Charleston, S. C.	9	53	ne.	Do.	15	89	n.w.
Chicago, Ill.	25	72	sw.	Do.	16	94	n.w.
Do.	27	66	sw.	Do.	17	89	n.w.
Columbus, Ohio	22	52	n.w.	Do.	18	68	n.w.
Do.	23	50	w.	Do.	19	60	n.w.
Do.	24	60	n.w.	Do.	20	58	n.w.
Dodge, Kans.	20	72	s.	Do.	21	64	n.w.
El Paso, Tex.	4	52	w.	Do.	22	59	n.w.
Fort Worth, Tex.	27	50	s.	Do.	23	55	n.w.
Huron, S. Dak.	21	60	se.	Do.	26	61	n.w.
Lincoln, Nebr.	26	76	n.w.	Do.	27	66	n.w.
Miles City, Mont.	8	54	sw.	Do.	28	66	n.w.
Minneapolis, Minn.	22	50	se.	Do.	31	65	n.w.
Mount Tamalpais, Cal.	10	62	n.w.	Rapid City, S. Dak.	21	56	w.
Do.	11	55	n.w.	Sioux City, Iowa	9	51	w.
Do.	12	50	n.w.	Do.	17	50	s.
Do.	13	56	n.w.	Do.	18	51	sw.
Do.	14	59	n.w.	Do.	21	72	se.
Do.	15	90	n.w.	Do.	22	60	s.
Do.	16	79	n.w.	Tattoosh Island, Wash.	15	51	sw.
Do.	17	67	n.w.	Valentine, Nebr.	21	76	sw.
Do.	19	56	n.w.	Williston, N. Dak.	7	54	w.
Do.	20	74	n.w.	Do.	15	56	n.w.
New York, N. Y.	1	54	n.w.	Do.	22	66	e.
North Head, Wash.	13	56	se.				

Table III gives, for all stations that make observations at 8 a. m. and 8 p. m., the four component directions and the resultant directions based on these two observations only and without considering the velocity of the wind. The total movement for the whole month, as read from the dial of the Robinson anemometer, is given for each station in Table I. By adding the four components for the stations comprised in any geographical division the average resultant direction for that division can be obtained.

Table IV gives the total number of stations in each State from which meteorological reports of any kind have been received, and the number of such stations reporting thunderstorms (T) and auroras (A) on each day of the current month.

Table V gives a record of rains whose intensity at some period of the storm's continuance equaled or exceeded the following rates:

Duration, minutes ..... 5 10 15 20 25 30 35 40 45 50 60 80 100 120  
Rates per hour (ins.) .... 3.00 1.80 1.40 1.20 1.08 1.00 0.94 0.90 0.86 0.84 0.75 0.60 0.54 0.50

In the northern part of the United States, especially in the colder months of the year, rains of the intensities shown in the above table seldom occur. In all cases where no storm

of sufficient intensity to entitle it to a place in the full table has occurred, the greatest rainfall of any single storm has been given, also the greatest hourly fall during that storm.

Table VI gives, for about 30 stations furnished by the Canadian Meteorological Service, Prof. R. F. Stupart, director, the means of pressure and temperature, total precipitation and depth of snowfall, and the respective departures from normal values, except in the case of snowfall.

Table VII gives the heights of rivers referred to zeros of gages; it is prepared by the Forecast Division.

#### NOTES EXPLANATORY OF THE CHARTS.

Chart I, tracks of centers of high areas, and Chart II, tracks of centers of low areas, are prepared by the Forecast Division. The roman numerals show number and chronological order of highs (Chart I) and lows (Chart II). The figures within the circles show the days of the month; the letters *a* and *p* indicate, respectively, the observations at 8 a. m. and 8 p. m., seventy-fifth meridian time. Within each circle is also given (Chart I) the highest barometric reading and (Chart II) the lowest barometric reading at or near the center at that time, and in both cases as reduced to sea level and standard gravity.

Chart III.—Total precipitation. The scale of shades showing the depth of rainfall is given on the chart itself. For isolated stations the rainfall is given in inches and tenths, when appreciable; otherwise, a "trace" is indicated by a capital T, and no rain at all by 0.0.

Chart IV.—Sea-level pressure and resultant surface winds. The pressures have been reduced to sea level and standard gravity by the method fully described by Prof. Frank H. Bigelow on pages 13–16 of the Review for January, 1902. The pressures have also been further reduced to the mean of the twenty-four hours by the application of a suitable correction, to the mean of the 8 a. m. and 8 p. m. readings, at stations taking two observations daily, and to the 8 a. m. or 8 p. m. observation, respectively, at stations taking but a single observation. The diurnal corrections so applied will be found in Table 27, Volume II, Annual Report of the Chief of Weather Bureau, 1900–1901, pp. 140–164.

The isotherms on the sea-level plane have been constructed by means of the data summarized in chapter 8 of Professor Bigelow's Report on the Barometry of the United States and Canada, which can be found in the Annual Report of the Chief of the Weather Bureau for 1900–1901, Volume II. The correction  $t_0 - t$ , or temperature on the sea-level plane minus the station temperature, by Table 48 of the Barometry Report, is added to the observed surface temperature to obtain the adopted sea-level temperature.

The wind directions are the computed resultants of observations at 8 a. m. and 8 p. m. daily. The resultant duration is shown by figures attached to each arrow.

Chart V.—Hydrographs for seven principal rivers of the United States, prepared by the Forecast Division.

Chart VI.—Surface temperatures; maximum, minimum, and mean of these. Lines of equal monthly mean temperature in red; lines of equal maximum temperature in black; and lines of equal minimum temperature (dotted) also in black.

Chart VII.—Percentage of sunshine. The average cloudiness at each Weather Bureau station is determined by numerous personal observations during the day. The difference between the observed cloudiness and 100, it is assumed, represents the percentage of sunshine, and the values thus obtained have been used in preparing Chart VII.

Chart VIII. Isobars and isotherms at 10,000 feet. The mean monthly station pressure for each station has been reduced to the 10,000-foot plane by entering Table 53, "Reduction of pressure to the sea level, the 3500 and 10,000-foot planes" pages 789–988, Barometry Report, with the temperature argument  $t$  corresponding to  $\theta_2$  and correcting the station pressure by the reduction  $B_2 - B$  after applying the plateau correction,  $C \downarrow \theta_2 H$ , and the corrections for  $e$  and  $\downarrow A$ , the argument  $t$  being the mean monthly air temperature. This reduction is fully described in Professor Bigelow's Report on the Barometry of the United States and Canada, pages 772 to 786 of the Annual Report of the Chief of Weather Bureau for 1900–1901, Volume II. The reduction for obtaining  $B_2$  may also be found by using gradients from the station pressure to the height of 10,000 feet as set forth on pages 18 and 19, of the MONTHLY WEATHER REVIEW for January 1902.

The isotherms on the 10,000-foot plane have been computed by using the gradients for temperature for each month and station as shown by the Summary Table of Normals, Table 48, Chapter VIII, of Professor Bigelow's Report on the Barometry of the United States and Canada.

Chart IX.—Isobars and isotherms at 3500 feet. The pressure and temperature data entered on this chart are found by the method described for the same data on the 10,000 foot plane.

Chart X.—The total snowfall. This is based on the reports from regular and voluntary observers, and shows the depth of the snowfall during the month in inches. In general, the depth is shown by lines inclosing areas of equal snowfall, but in special cases figures are also given.

Chart XI.—Depth of snow on ground at the end of the month.

When there is no snow the last two charts may be replaced by others.

























TABLE II.—*Climatological record of voluntary and other cooperating observers—Continued.*

Stations.	Temperature. (Fahrenheit.)			Precipita- tion.		Stations.	Temperature. (Fahrenheit.)			Precipita- tion.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.		Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
<i>Wyoming—Cont'd.</i>	°	°	°	<i>Ins.</i>	<i>Ins.</i>	<i>West Indies.</i>	°	°	°	<i>Ins.</i>	<i>Ins.</i>
Thayne . . . . .	80	20	44.2	2.18		Isle of Pines, Cuba . . . . .	92	65	79.0	3.10	
Thermopolis . . . . .	84	18	47.4	3.16		Consuelo S. P. Macori S. D. . . . .	92	60	78.4	10.40	
<i>Porto Rico.</i>											
Adjuntas . . . . .	88	51	74.2	6.76							
Aguadilla . . . . .	94	59	77.8	8.42							
Aguirre . . . . .	94	66	81.7	2.36							
Arecibo . . . . .	92	68	79.0 <sup>t</sup>	8.43							
Barros . . . . .	88	48	73.1	5.53							
Bayamon . . . . .	89	56	75.0	5.20							
Caguas . . . . .	97	51	79.7	3.69							
Canovanas . . . . .	97	67	82.7	0.93							
Cayey . . . . .	95	50	75.2	0.62							
Cldra . . . . .	86	50	69.4	2.20							
Coamo . . . . .	93	57	79.2	0.21							
Corozal . . . . .	95	55	77.4	2.58							
Fajardo . . . . .	93	60	80.9	5.90							
Guanica . . . . .	92	58	79.4	2.49							
Hacienda Josefina . . . . .	92	52	77.2	2.36							
Hacienda Peria . . . . .	99	62	81.0	10.34							
Humacao . . . . .	93	70	83.0	5.80							
Isabela . . . . .	91	65	77.8	12.08							
Juan Diaz . . . . .	91	65	80.1	3.02							
Le Carmelita . . . . .	86	59	74.4	11.75							
Las Marias . . . . .	91	60	77.4	10.67							
Manati . . . . .	98	60	79.3	4.98							
Maunabo . . . . .	95	66	77.2	7.36							
Mayaguez . . . . .	97	63	79.9	11.58							
Morovis . . . . .	95	67	77.7	9.58							
Ponce . . . . .	90	62	80.0	1.23							
Rio Piedras . . . . .	92	56	77.0	9.35							
San German . . . . .	94	66	82.6	4.53							
San Lorenzo . . . . .	95	53	77.6	4.93							
San Salvador . . . . .	89	60	75.5	8.49							
Santa Isabel . . . . .	93	61	80.2	3.24							
Utuado . . . . .	94	56	76.6	11.70							
Vieques . . . . .	92	66	80.5	3.31							
Yauco . . . . .	80	63	79.8	5.04							
<i>Mexico.</i>											
Ciudad P. Diaz . . . . .	92	40	69.4	2.45							
Coatzacoalcos . . . . .	98	67	79.9	0.80							
Leon de Aldamas . . . . .	96	49	72.1	0.51							
Vera Cruz . . . . .	89	61	79.0	0.30							
<i>New Brunswick.</i>											
St. John . . . . .	70	32	48.3	2.77							
<i>Isthmus of Panama.</i>											
Alhajuela . . . . .	95	73	81.0	7.84							
Bohio . . . . .											
Colon . . . . .											
Gamboa . . . . .											
La Boca . . . . .	88	73	79.3	11.10							

## EXPLANATION OF SIGNS.

\*Extremes of temperature from observed readings of dry thermometer.

A numeral following the name of a station indicates the hours of observation from which the mean temperature was obtained, thus:

<sup>1</sup> Mean of 7 a. m. + 2 p. m. + 9 p. m. + 4.

<sup>2</sup> Mean of 8 a. m. + 8 p. m. + 2.

<sup>3</sup> Mean of 7 a. m. + 7 p. m. + 2.

<sup>4</sup> Mean of 6 a. m. + 6 p. m. + 2.

<sup>5</sup> Mean of 7 a. m. + 2 p. m. + 2.

The absence of a numeral indicates that the mean temperature has been obtained from daily readings of the maximum and minimum thermometers.

An italic letter following the name of a station, as "Livingston <sup>a</sup>" "Livingston <sup>b</sup>," indicates that two or more observers, as the case may be, are reporting from the same station. A small roman letter following the name of a station, or in figure columns, indicates the number of days missing from the record; for instance "<sup>14</sup>" denotes 14 days missing.

No note is made of breaks in the continuity of temperature records when the same do not exceed two days. All known breaks, of whatever duration, in the precipitation record receive appropriate notice.

NOTE.—The following change has been made in the names of stations: Indiana, Prairie Creek changed to Farmersburg near.

## CORRECTIONS.

April, 1903, Utah, Grover, make maximum temperature 75 instead of 95.

TABLE III.—Resultant winds from observations at 8 a. m. and 8 p. m., daily, during the month of May, 1903.

Stations.	Component direction from—				Resultant.		Stations.	Component direction from—				Resultant.	
	N.	S.	E.	W.	Direction from—	Duration.		N.	S.	E.	W.	Direction from—	Duration.
<i>New England.</i>							<i>New England.</i>						
Eastport, Me.	19	22	15	20	s. 59 w.	6	Moorhead, Minn.	20	22	26	14	s. 81 e.	12
Portland, Me.	19	30	9	12	s. 15 w.	11	Bismarck, N. Dak.	20	18	20	16	n. 63 e.	4
Concord, N. H.	17	8	11	4	n. 38 e.	11	Williston, N. Dak.	14	21	19	21	s. 16 w.	7
Northfield, Vt.	19	32	14	6	s. 32 e.	15	<i>Upper Mississippi Valley.</i>						
Boston, Mass.	16	22	18	21	s. 27 w.	7	Minneapolis, Minn.*	13	11	10	3	n. 74 e.	7
Nantucket, Mass.	16	21	21	15	s. 45 e.	8	St. Paul, Minn.	17	25	29	11	s. 66 e.	20
Block Island, R. I.	13	26	25	14	s. 45 e.	16	La Crosse, Wis. †	7	20	9	1	s. 32 e.	15
Narragansett, R. I. *	6	15	10	8	s. 13 e.	9	Davenport, Iowa.	14	21	29	9	s. 71 e.	21
New Haven, Conn.	22	21	20	13	n. 82 e.	7	Des Moines, Iowa.	8	31	23	11	s. 28 e.	26
<i>Middle Atlantic States.</i>							Dubuque, Iowa.	13	27	29	9	s. 55 e.	24
Albany, N. Y.	19	29	13	12	s. 6 e.	10	Keokuk, Iowa.	13	29	23	14	s. 29 e.	18
Binghamton, N. Y. †	14	10	7	6	n. 14 e.	4	Cairo, Ill.	11	34	26	6	s. 41 e.	30
New York, N. Y.	12	24	23	16	s. 30 e.	14	Springfield, Ill.	13	31	19	9	s. 29 e.	21
Harrisburg, Pa.	16	23	24	12	s. 60 e.	14	Hannibal, Mo. †	7	12	15	5	s. 63 e.	11
Philadelphia, Pa.	19	24	22	11	s. 66 e.	12	St. Louis, Mo.	11	35	21	4	s. 35 e.	29
Scranton, Pa.	25	13	27	10	n. 55 e.	21	<i>Missouri Valley.</i>						
Atlantic City, N. J.	17	18	23	16	s. 82 e.	7	Columbia, Mo.*	3	15	14	3	s. 43 e.	16
Cape May, N. J.	18	24	23	10	s. 65 e.	14	Kansas City, Mo.	9	31	30	4	s. 50 e.	34
Baltimore, Md.	21	23	21	12	s. 13 e.	9	Springfield, Mo.	11	35	29	4	s. 46 e.	35
Washington, D. C.	16	23	24	13	s. 58 e.	13	Topeka, Kans.*	6	17	9	2	s. 32 e.	13
Cape Henry, Va. †	10	8	11	9	n. 45 e.	3	Lincoln, Nebr.	16	31	24	5	s. 52 e.	24
Lynchburg, Va.	13	18	34	13	s. 77 e.	22	Omaha, Nebr.	15	35	16	9	s. 19 e.	21
Norfolk, Va.	17	19	34	6	s. 86 e.	23	Valentine, Nebr.	22	17	19	17	n. 22 e.	5
Richmond, Va.	19	23	24	8	s. 76 e.	16	Sioux City, Iowa †	10	13	13	4	s. 72 e.	10
Wytheville, Va.	10	14	32	17	s. 75 e.	16	Pierre, S. Dak.	17	20	20	19	s. 18 e.	3
<i>South Atlantic States.</i>							Huron, S. Dak.	24	18	23	11	n. 63 e.	13
Asheville, N. C.	11	28	30	8	s. 52 e.	28	Yankton, S. Dak. †	9	11	13	6	s. 74 e.	7
Charlotte, N. C.	18	21	27	11	s. 79 e.	16	<i>Northern Slope.</i>						
Hatteras, N. C.	20	17	28	14	n. 78 e.	14	Havre, Mont.	18	14	9	35	n. 81 w.	26
Kittyhawk, N. C. *	12	9	15	7	n. 69 e.	8	Miles City, Mont.	12	23	10	27	s. 57 w.	20
Raleigh, N. C.	16	16	27	17	e.	10	Helena, Mont.	13	19	10	35	s. 77 w.	26
Wilmington, N. C.	22	19	28	12	n. 79 e.	16	Kalispell, Mont.	7	19	13	35	s. 61 w.	25
Charleston, S. C.	15	20	32	12	s. 76 e.	21	Rapid City, S. Dak.	16	16	14	30	w.	16
Columbia, S. C.	13	19	37	8	s. 78 e.	30	Cheyenne, Wyo.	28	12	8	23	n. 43 w.	22
Augusta, Ga.	18	19	34	8	s. 88 e.	26	Lander, Wyo.	16	23	12	24	s. 60 w.	14
Savannah, Ga.	13	20	30	14	s. 66 e.	18	North Platte, Nebr.	19	22	14	23	s. 72 w.	10
Jacksonville, Fla.	14	20	32	9	s. 55 e.	28	<i>Middle Slope.</i>						
<i>Florida Peninsula.</i>							Denver, Colo.	21	22	16	15	s. 45 e.	1
Jupiter, Fla.	21	11	37	9	n. 70 e.	30	Pueblo, Colo.	20	14	18	26	n. 53 w.	10
Key West, Fla.	18	9	37	11	n. 71 e.	23	Concordia, Kans.	15	33	16	7	s. 27 e.	20
Tampa, Fla.	21	5	31	17	n. 41 e.	21	Dodge, Kans.	21	27	21	9	s. 63 e.	13
<i>Eastern Gulf States.</i>							Wichita, Kans.	16	33	18	5	s. 38 e.	22
Atlanta, Ga.	11	22	30	14	s. 56 e.	19	Oklahoma, Okla.	19	32	16	5	s. 40 e.	17
Macon, Ga. †	12	7	14	3	n. 66 e.	12	<i>Southern Slope.</i>						
Pensacola, Fla. †	10	8	16	2	n. 82 e.	14	Abilene, Tex.	15	31	22	12	s. 32 e.	19
Mobile, Ala.	23	26	18	5	s. 77 e.	13	Amarillo, Tex.	18	32	13	14	s. 4 w.	14
Montgomery, Ala.	15	17	25	19	s. 72 e.	6	El Paso, Tex.	20	9	18	31	n. 50 w.	17
Meridian, Miss. †	7	14	14	5	s. 52 e.	11	Santa Fe, N. Mex.	13	30	21	17	s. 13 e.	18
Vicksburg, Miss.	10	27	29	9	s. 50 e.	26	Flagstaff, Ariz.	10	12	27	22	s. 68 e.	5
New Orleans, La.	15	30	28	8	s. 53 e.	25	Phoenix, Ariz.	8	30	6	33	s. 51 w.	35
<i>Western Gulf States.</i>							Independence, Cal.	22	11	11	33	n. 64 w.	25
Shreveport, La.	11	27	29	12	s. 47 e.	23	<i>Middle Plateau.</i>						
Fort Smith, Ark.	12	20	33	6	s. 73 e.	25	Carson City, Nev.	21	12	4	32	n. 72 w.	29
Little Rock, Ark.	12	25	29	8	s. 59 e.	25	Winnebago, Nev.	29	13	17	22	n. 17 w.	17
Corpus Christi, Tex.	8	37	29	6	s. 38 e.	37	Modena, Utah.	5	17	9	41	s. 69 w.	34
Fort Worth, Tex.	17	31	14	13	s. 4 e.	14	Salt Lake City, Utah.	24	15	20	16	n. 45 e.	6
Galveston, Tex.	5	36	26	13	s. 23 e.	34	Grand Junction, Colo.	13	16	20	26	s. 63 w.	7
Palestine, Tex.	18	30	16	10	s. 27 e.	13	<i>Northern Plateau.</i>						
San Antonio, Tex.	20	24	30	9	s. 79 e.	21	Baker City, Oreg.	25	24	16	15	n. 45 e.	1
Taylor, Tex. †	11	15	8	5	s. 37 e.	5	Boise, Idaho.	16	15	32	32	w.	17
<i>Ohio Valley and Tennessee.</i>							Lewiston, Idaho †	4	10	19	4	s. 68 e.	16
Chattanooga, Tenn.	15	25	18	18	s.	10	Pocatello, Idaho.	2	28	25	22	s. 9 e.	20
Knoxville, Tenn.	20	18	19	23	n. 63 w.	4	Spokane, Wash.	10	29	14	23	s. 25 w.	21
Memphis, Tenn.	8	31	28	7	s. 42 e.	31	Walla Walla, Wash.	9	40	13	14	s. 2 w.	31
Nashville, Tenn.	12	27	26	11	s. 45 e.	21	<i>North Pacific Coast Region.</i>						
Lexington, Ky. †	3	17	13	5	s. 30 e.	16	North Head, Wash.	27	15	6	30	n. 63 w.	27
Louisville, Ky.	15	25	24	8	s. 58 e.	19	Port Crescent, Wash. *	5	3	6	23	n. 83 w.	17
Evansville, Ind. †	7	16	14	2	s. 53 e.	15	Seattle, Wash.	14	30	23	13	s. 32 e.	19
Indianapolis, Ind.	12	29	26	6	s. 50 e.	26	Tacoma, Wash.	23	19	1	32	n. 83 w.	31
Cincinnati, Ohio.	12	19	36	11	s. 74 e.	26	Tatoosh Island, Wash.	10	22	8	36	s. 67 w.	30
Columbus, Ohio.	10	28	30	9	s. 49 e.	28	Portland, Oreg.	22	21	5	29	n. 88 w.	24
Pittsburg, Pa.	18	23	19	15	s. 39 e.	6	Roseburg, Oreg.	36	8	16	19	n. 6 w.	28
Parkersburg, W. Va.	18	25	21	9	s. 60 e.	14	Eureka, Cal.	42	7	6	13	n. 11 w.	36
Elkins, W. Va.	22	23	15	12	s. 72 e.	3	Mount Tamalpais, Cal.	38	0	0	40	n. 46 w.	55
<i>Lower Lake Region.</i>							Red Bluff, Cal.	35	16	17	8	n. 25 e.	21
Buffalo, N. Y.	10	22	24	18	s. 27 e.	13	Sacramento, Cal.	17	33	14	15	s. 3 w.	16
Oswego, N. Y.	17	25	11	17	s. 37 w.	10	San Francisco, Cal.	2	9	0	55	s. 83 w.	56
Rochester, N. Y.	20	21	20	18	s. 63 e.	2	Point Reyes Light, Cal. *	3	3	1	25	w.	24
Syracuse, N. Y.	17	25	9	18	s. 48 w.	12	Southeast Farallon.	38	6	1	41	n. 51 w.	51
Erie, Pa.	12	21	26	9	s. 62 e.	19	<i>South Pacific Coast Region.</i>						
Cleveland, Ohio.	23	21	25	9	s. 83 e.	12	Fresno, Cal.	43	0	2	42	n. 43 w.	59
Sandusky, Ohio. †	5	14	10	7	s. 18 e.	10	Los Angeles, Cal.	9	23	11	33	s. 58 w.	26
Toledo, Ohio.	16	21	30	10	s. 76 e.	21	San Diego, Cal.	14	20	7	34	s. 78 w.	28
Detroit, Mich.	17	23	28	11	s. 71 e.	18	San Luis Obispo, Cal.	15	13	0	34	n. 87 w.	34
<i>Upper Lake Region.</i>							<i>West Indies.</i>						
Alpena, Mich.	11	26	31	10	s. 55 e.	26	Basseterre, St. Kitts, W. I.						
Escanaba, Mich.	24	22	16	7	n. 77 e.	9	Bridgetown, Barbados.	0	16	56	0	s. 74 e.	58
Grand Haven, Mich.	12	27	22	13	s. 31 e.	18	Grand Turk, W. I. †	8	4	21	1	n. 79 e.	20
Houghton, Mich. †	5	13	10	6	s. 27 e.	9	Hamilton, Bermuda.	22	5	37	12	n. 56 e.	30
Marquette, Mich.	22	24	10	20	s. 79 w.	10	Havana, Cuba. †	1	3	25	4	s. 85 e.	21
Port Huron, Mich.	18	25	21	9	s. 60 e.	14	Puerto Principe, Cuba.	21	34	33	5	s. 43 e.	41
Sault Ste. Marie, Mich.	8	20	30	19	s. 43 e.	16	San Juan, Porto Rico.	3	34	33	5	s. 43 e.	41
Chicago, Ill.	17	30	19	9	s. 38 e.	16							
Milwaukee, Wis.	27	21	19	8	n. 61 e.	12							
Green Bay, Wis.	17	27	25	7	s. 61 e.	9							
Duluth, Minn.	39	4	34	7	n. 38 e.	44							

\* From observations at 8 p. m. only. † From observations at 8 a. m. only.







